

2013 Research Workshop (UTRAC) Group 7

Precast Intersections

Precast all pavement for an intersection and place it rapidly (overnight or over a weekend). Suggestion was made for 5400 S. @ 5600 W., a project which is coming up.

Idea: Could the grade be set 2-3 inches low and then a bed of grout be placed over the entire area and then the panels set on the grout, like tiles being set in mortar? If need be, relief ports could be provided in the panels for the grout to ooze out as the panel is set to grade.

Pro	Con
Minimize impacts to public	Accommodating utilities (block outs, etc.)
Minimize impacts to local businesses	Tolerances for fitting up the panels, casting accuracy
Higher quality concrete	Vertical grade control, how to adjust panels vertically to provide smooth ride.
Safety (less exposure for workers and less impact to traffic)	Differential settlement
Public support for "Get in, Get out, Stay out"	Complex design details
	Cost?

Votes: 5

Digital Construction Site

A single electronic site where all data related to a project will be stored and accessible. This would include Electronic Plans, Design Data, Testing Information, Documentation, etc. The site would be cloud based and accessible to contractors and UDOT staff. This idea also encompasses the idea of electronic plans, i.e. not publishing paper plans but only electronic plans, design data, specs, etc.

Pro	Con
Increased efficiency	Fear of losing information
Transparency	Security
Information tracking	Liability?
Reduced errors	Fear of market shift
	QC/QA process undefined

It was noted that there are not currently industry standards for such a sight. Data formats, etc. need to be standardized.

Votes: 5

Laser Striping

The idea is that instead of painting lines on the road, the striping could be projected from overhead using lasers. The delineation could then be actively managed just like and remotely modified much like signal timing, etc. Also, the striping could be animated to help provide active guidance for drivers, for example, through complex intersections.

Pro	Con
Flexibility	Amount of energy used?
Communicate more information to drivers	Power backup
Manage the resource of pavement more effectively	How will it work in bright sun? Rain and Snow?
Driver expectation	Driver expectation

Votes: 4

Modular Embankment

The idea is to use old shipping containers to create embankments. Used containers are readily available at very low prices (approx. \$2000 to \$3000 each). They are easily transported and can be rapidly stacked. They are very strong and can easily withstand the weight of several layers along with highway loads. Because they enclose such a large volume of empty space, they are equivalent to lightweight fill or even geofoam. They could be used as either temporary embankment, in which case they are easy to disassemble and remove, or permanent embankment. If they will be permanent we would need to develop a way to prevent corrosion (perhaps spray galvanizing?).

Pro	Con
Rapid construction	Long term durability Rust ?
Light weight	Would need a load distribution slab.
Green	
Reusable	

Votes: 3

Drones

Could Unmanned Aerial Vehicles (UAVs or Drones) be used to collect real time traffic data? During Construction they could provide real time status of queuing, etc. They could also be used by the TOC to monitor traffic during events; provide real time feedback as changes are made to signal timing, etc.

Could UAVs be used for avalanche control?

One of the leading vendors of this technology is right here in Utah (L3).

Pro	Con
Real time data	Privacy concerns
Flexibility	Potential airspace issues
Low cost	
Safety (By improving operations and by keeping workers out of dangerous situations)	

Votes Received: 2

Workers' Safety

Are there technologies available to create safer work zones?

With cars becoming smarter is there a way to communicate the presence of workers to the drivers?

In other industries there is a movement to "Design for Safety". Is this applicable to our industry?

Should a Safety Officer be involved in the design of projects? Review plans before they are advertised?

Should we review all phases of the Project Lifecycle (Design, Construction, Operation, and Maintenance) and identify the top 5 causes of accidents in each phase? Then we could develop mitigation for each.

Pro	Con

Votes received: 1

In Place Recycling

This idea is more than just in place recycling of asphalt. It includes a complete re-working of sub-grade materials as well. For example, could a machine be developed that would grind up all of the pavement and sub-grade, sort the material, processes the various materials (by adding any materials required bring the material up to spec.) and replacing the material.

Pro	Con
Re-use materials on site	The technology doesn't currently exist
Saves time	Would our current specs allow?
Increased quality?	
Saving costs and fuel	
Increased safety	
Green	

Votes: 0

Better Base for Precast Pavement Slabs

There is a need to develop a better method of setting precast pavement slabs rapidly. One thought was to use a bed of grout which would allow the pavement panels to be set much like tiles in a bed of mortar. Another thought was to use Grout Bags, basically sealed fabric bags of grout which would be placed on the grade and then the panel would be set. The bags would then “squish” under the panel and conform to the sub-grade and the bottom of the panel.

Pro	Con
Rapid construction of pavement	Requires skilled labor for placement
Uniform load distribution	Cost?
Better quality	Learning curve

Votes: 0

Utility installation

Is there a way to install utilities in existing roads (pipes, etc.) without trenching but cheaper than current boring techniques? Another thought was to install utility corridors (box culverts) during initial construction or re-construction that allow utility companies to install their facilities in the corridor without tearing up the road.

Pro	Con

Votes: 0

Multi-way Roadway



The idea is a new type of urban roadway. The main flow of traffic is carried in the center lanes which have limited access points. To the outside of corridor are frontage roads which allow access to properties along the roadway. There are limited places where the main traffic can move into and out of the frontage roads. This idea is being considered by at least one local city but there are not currently any tools or procedures to model this configuration.

Pro	Con
Maximize use of current ROW width	Unfamiliar
Balances access with mobility	Economics?
Currently used in other countries (Mexico)	Perceptions of property owners, drivers

Votes: 0

Risk Communication

How do we effectively communicate risk to the public? This includes both our risks and the public's risks.

For example, how do we communicate the true risks of distracted driving in an effective, persuasive way? How do we let the public know about the vagaries of highway construction? There are people that are expert at communicating risk such as the Society for Risk Assessment. Could we partner with them to improve our communications with the public?

Pro	Con
Effective education	Privacy issues
Make it personal	Cost?
Similar to Behavior Based Safety	

Votes: 0

Temporary Construction Striping

Are there new technologies for creating temporary striping that can be removed without damaging the pavement? Tape that has an adhesive that releases with heat? Paint that reacts with certain wavelengths of light to disappear (maybe use a laser to remove)?

Pro	Con
Doesn't scar the pavement	Technology not yet developed
Increase safety by eliminating conflicting ghost lines	
Increased flexibility by using more phases of construction because we're not worried about scaring the pavement	

Votes: 0

Ideas from Europe

What are they doing in Europe that we could use here to increase durability or reduce impacts of our projects?

No pro's or con's identified

Votes: 1 (I think they just wanted a trip to Europe)

Large Helical Piles

Currently the Department uses either Pipe Piles or, rarely, H Piles. We also use Drilled Shafts where a vertical shaft is excavated then filled with reinforced concrete. There is a different type of pile used in other industries that may be applicable to bridges. These are Helical Piles, which are like giant screws that are twisted into the ground.

Pro	Con
Reduced spoils compared to Drilled Shafts.	Currently not approved by AASHTO
Good for contaminated sites where disposal of spoils would be a problem	No design criteria for bridges with seismic loading
They are not driven (pounded) like traditional piles so the noise and vibration impacts are greatly reduced.	

Votes: 1

Going Vertical

Are there places where building additional roadway capacity is not the answer but instead we could install an alternative transportation mode over our existing corridors? For example, gondolas or trams?

There is a company here in Utah that specializes in these types of systems. The name is Dopplemyer.

Pro	Con
Maximize use of current ROW width	Unfamiliar
Transportation in modes other than cars	Economics?
	Public Acceptance

Votes: 1

Missouri Bridge Program

Could we do something similar to the way that Missouri did their bridge program? Basically they let a contract to (I believe) Design Build Finance a large number of bridge replacements over a large area of the state. We do not need to do this for bridges but is there some other aspect of our system that would benefit from this? We are doing something similar with the striping warrantee project and have looked at a Structures preservation project.

Before Pro's and Con's can be identified we need to contact Missouri and see how it worked for them.

Votes: 0

Reflective Pavement Markers

Other states use reflective pavement markers which provide very visible delineation at night and during wet weather. UDOT, and other snow states, have not adopted them because of their problems with snow removal. Even the so-called plowable markers are not durable and cause problems with the plows. Some states have recessed the reflective markers by grinding a small trench for them to sit in. This leads to a concern with pavement distress due to freeze-thaw.

Is there a better way to install reflective markers to minimize these issues?

No pro's or con's developed.

Votes: 0

Adapting New Technology

Can we adapt current New Technology for uses not currently identified? For example, could Lidar be used to monitor settlement instead of settlement platforms? Would this be any cheaper? What would the accuracy be? There are currently projects in the Middle East that are using satellite imaging to monitor settlement. The same questions apply.

No pro's or con's developed.

Votes: 0

Pre-Formed CMGC Teams

This is the idea that, when the Department wants to let a CMGC project, they would put out a notification and allow Contractors to team with Design Consultants. The Department would then go through a qualifications based selection of the teams. However, the Department would enter into separate contracts with the Designer and the Contractor; that way we still have control over the design. The advantage is that we are not forcing a marriage between the designer and the contractor.

Pro	Con
More innovation	Unsure of legal implications (procurement laws)
Quicker procurement	What about the Best Value requirements?
Better collaboration	

Votes: 1

Split Pipe Diaphragm

In other places they are starting to use a split pipe for the stiffener at diaphragm locations. This means that a simple tab can be welded at any angel to the pipe and unique bend connectors are not required for each situation. This saves time during fabrication and reduces the opportunities for errors.

No pro's or con's developed

Votes: 0

Permanent Deck

It was suggested that by using stainless steel reinforcing along with post-tensioning, a deck which lasts the life of the bridge could be accomplished. Although the up-front costs would be higher it was felt that the Life-Cycle costs would be significantly less. This would require more investigation.

No pro's or con's developed.

Votes: 0